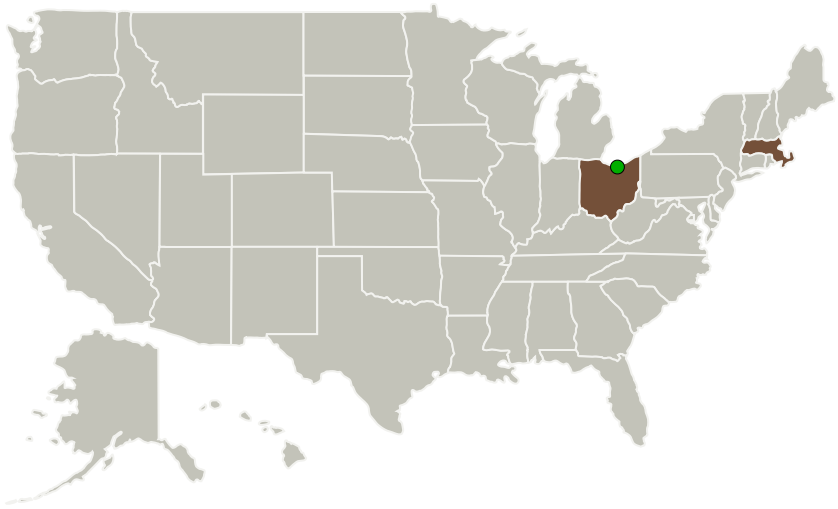
Ultrasensitive, Fast-Response Size-Dependent Soot Spectrometer, Phase I

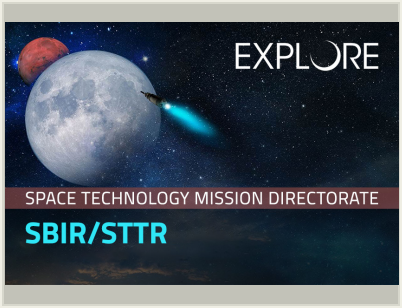
Completed Technology Project (2010 - 2010)

Project Introduction

We propose to develop a "black carbon" (soot) monitor for measuring non-volatile particulate emissions from gas turbine engines employing a proprietary optical extinction measurement technique based on cavity attenuated phase shift spectroscopy (CAPS) operting in conjunction with a differential mobility analyzer. The singular aspect of the CAPS approach is that extinction is measured by determining shifts in the phase angle of a modulated light beam instead of changes in the intensity of the ransmitted light caused by the presence of particulates. This aspect makes the sensor immune to either abrupt or gradual changes in the intensity of the light caused by temperature or pressure fluctuations or light source deterioration. Furthermore, the sensor rarely needs to be calibrated ⇔ i.e., its span value, a function of the optical properties of the particles themselves, remains virtually constant. This sensor does not rely on the deposition of particles on a filter and requires little maintenance. The monitor will be able to measure the size dependent particle mass concentration in the sub-micrograms per cubic meter with a sampling period of only 1 second.

Primary U.S. Work Locations and Key Partners





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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Aerodyne Research, Inc	Lead Organization	Industry	Billerica, Massachusetts
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139513)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Aerodyne Research, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

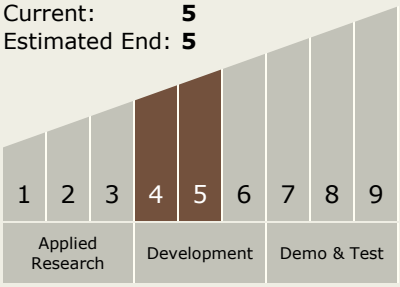
Carlos Torrez

Principal Investigator:

Andrew Freedman

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Completed Technology Project (2010 - 2010)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System